

BEES FROM SAN MIGUEL ISLAND, CALIFORNIA

BY T. D. A. COCKERELL

The bees recorded below were taken during the last week of July, 1937, on the occasion of the expedition of the Senior Boy Scouts to the Island.

BOMBUS CALIFORNICUS Smith

Rather common on San Miguel, at flowers of *Mesembryanthemum crystallinum*, July 28 and 30. One is a male, with long antennæ and two yellow-haired tergites.

On the mainland, at Santa Barbara (July 16 at flowers of *Leptospermum*) Francheschi Park (July 17, at *Gaillardia*) and at Montecito (July 18, collected by Donal Jones) the similar looking *Bombus* is *B. vosnesenskii* Radoszkowsky. Also on the mainland, at Carpinteria, July 17, at flowers of *Vicia*, I took *B. fervidus* Fabricius.

Bombus nevadensis miguelensis Cockerell, new subspecies

Male. Hair of face nearly all black: lower part of pleura with black hair; dorsum of thorax with a very large pure black patch, which does not nearly reach tegulæ at sides, though the interval between the patch and the tegulæ has black hair intermixed; first two tergites with light yellow hair, third with black hair basally but a broad light yellow fringe; fourth tergite with black hair, apex with red. The genitalia are of the *B. nevadensis*, not *B. crotchii*, type.

California: San Miguel Island, July 28, 1937, taken by William Smith.

Bombus crotchii semisuffusus Cockerell, new subspecies

Female. Hair of occiput and vertex all black; yellow band of second tergite much weaker, not broad and sharply defined, its middle portion dusky; the two apical tergites have red hair. The basal nervure goes a little basad of nervulus in this species.

California: San Miguel Island, July 30, at flowers of *Mesembryanthemum crystallinum*.

Epeolus eastwoodæ Cockerell, new subspecies

Male. Length about 8 mm.; black, including antennæ, but the tarsi entirely red, and the tibiæ reddened at apex; tegulæ bright chestnut red posteriorly, but black in front; apical plate of abdomen reddish black; eyes very dark greenish. Head broad, orbits converging below; face densely covered with pure white hair, except apex of clypeus which is dull and minutely granular, with the margin shining; mandibles bright red in middle; scape swollen, highly polished; flagellum rather thick; mesothorax and scutellum dull and minutely sculptured; hair of thorax above distinctly tinged with ochreous; anterior middle of mesothorax densely covered with hair, taking the form of two very broad bands separated by the median incised line, each band emarginate posteriorly; anterior corners of mesothorax covered with hair, weakened mesad and just reaching the bands; posterior margins of mesothorax and scutellum (the latter including axillæ) covered with hair, the band on mesothorax broadened at sides; postscutellum with dense pale hair; metathorax hairy at sides, the median and basal bare areas dull seen from above, but moderately shining from another angle; mesopleura mainly densely hairy, but with a transverse bare spot on upper part, and a large bare area (shining between punctures) below; wings a little dusky at apex; recurrent nervures joining second and third cubital cells near middle; hind coxæ with a conspicuous band of pure white hair; pale hair of legs otherwise slightly ochreous; spurs pale red; black area of first tergite a broad transverse band, straight in front, obliquely truncate at sides, angulate in middle posteriorly, almost dividing the apical hair-band; hair-band of second tergite rather broadly interrupted in middle, and having a rounded projection at each side in front, the angle formed by the projection and the band beyond a little less than a right angle; hair-bands on tergites 3 to 5 narrowly interrupted, the upper margin of that on third strongly undulate; first two sternites mainly covered with white hair, and third with an apical band, which is slightly interrupted in middle.

California: San Miguel Island, Cuyler's Cove, near the shore, July 27, 1927 (Cockerell). It was at flowers of *Malacothrix implicata* Eastwood. In my tables it falls nearest to *Epeolus heterurus* Cockerell and Sandhouse but it differs in the pattern of the thorax, the partly bare mesopleura, the very short axillar spines, the clearer wings, narrower third cubital cell, straight anterior margin of black area on first tergite, and other characters. The mark on first tergite is much more like that of *E. rufomaculatus* Cockerell and Sandhouse. Named after Miss Alice Eastwood,

who has advanced our knowledge of the flora of the islands more than any other living botanist.

***Anthidium palliventre vanduzeei* Cockerell, new subspecies**

Larger (female about 12.7 mm. male about 14.5 mm.) all the tibiae of male with a yellow stripe; corners of sixth tergite of female prominent.

California: San Miguel Island. First found (one female) by Mr. E. P. Van Duzee, who was the first to collect a bee on San Miguel Island. I took a pair at Cuyler's Cove, July 30, 1937, hovering over *Phacelia scabrella* Greene. The male is the holotype.

***Anthophora californica erysimi* Cockerell, new subspecies**

Female. Larger and more robust, with broader face, and black instead of green eyes; width of head nearly 5 mm. width of abdomen nearly 6 mm.

California: San Miguel Island, on the top, at flowers of *Erysimum insulare* Greene, July 20, 1937 (Cockerell).

At Santa Barbara, August 2, my wife took *A. urbana* Cresson at flowers of *Lantana*. This species has a representative or subspecies (*A. catalinae* Cockerell, 1901) on Santa Catalina Island.

***Agapostemon californicus psammobius* Cockerell,
new subspecies**

Male (type). Scape all black; hind tibiae marked with black; hind femora usually with a continuous broad black band, bent in middle, on inner face (in one specimen this band is interrupted); venter with less yellow; genitalia with the squama intermediate in type between that of *A. texanus* and *A. angelicus* as figured by Sandhouse (Jl. Wash. Acad. Sci., 26, 1926, p. 81); the slender curved lower lobe is essentially as in *A. texanus*, but the upper one is produced, slender, like the end of a finger, the sinus between the lobes is elongate-oval; rounded below.

Female. Metathorax above less sculptured, the rugae indistinct; tegulae very dark brown, or a little green in front, with a yellow spot.

The male differs from Crawford's description of *A. californicus* thus; wings not clouded apically; front and middle femora broadly black above; hind femora as described above; venter with yellow only on basal part.

California: San Miguel Island, end of July, mostly at flowers of *Mesembryanthemum crystallinum* on the top of the island, but one female near the shore, Cuyler's Cove, at *Malacothrix implicata*. On Princess Islet a fragmentary male, remarkable for having the yellow band on first tergite rather broadly interrupted, was found in a web of *Metepeira gosoya* Chamberlin and Ivie (det. Gertsch), in a clump of prickly pear, *Opuntia littoralis* (Engelmann). In this specimen the mesothorax is of a splendid purple-blue.

I collected *A. californicus* Crawford at Santa Barbara, July 11-17, at flowers of *Mesembryanthemum*, *Scabiosa* and a boraginaceous plant. The female has the metathorax above strongly sculptured, the rugæ strong and regular; tegulæ fulvotestaceous, with a yellow spot. The male has or lacks a yellow stripe on scapa.

HALICTUS PAVONOTUS Cockerell

This very distinct species has been known from the sand hills at Pacific Grove and San Francisco. Sixteen males were taken on San Miguel, but no females. One male bee has the head unusually broad (diam. pr. 2.5 mm.) but is only an individual variation. All were taken at Cuyler's Cove, visiting flowers of *Malacothrix implicata*.

Halictus (Seladonia) meliloti catalinensis (Cockerell) was taken in some numbers at Santa Barbara, females at flowers of *Ceanothus* and fennel. This bee was described from Catalina Island, but has long been known to be common on the mainland. No *Seladonia* occurred on San Miguel. The only other metallic-colored *Halictus* which I took at Santa Barbara was *H. helianthi* Cockerell, females common on fennel, but also taken on *Ceanothus* and marguerite daisy. This was not found on San Miguel.

HALICTUS (CHLORALICTUS) GRINNELLI, Cockerell

One female was taken, at flowers of *Eschscholtzia* near the ranch house, on the top of the Island. I cannot separate it from *H. grinnelli* described from the Coronado Islands.

HALICTUS (CHLORALICTUS) NEVADENSIS Crawford

San Miguel, one female on top of Island, near ranch house, at flowers of *Eschscholtzia*, July 31. This has the general ap-

pearance, yellowish wings and reddened tarsi, of *H. nevadensis*, but compared with a paratype, differs by the longer area of metathorax and depressed line down middle of scutellum. The latter character is evident in a specimen of *H. nevadensis* I collected on the Coronado Islands. My series of specimens, attributed to *H. nevadensis*, is variable, and it is possible that closer study, with more material, will prove the existence of more than one species.

Halictus (*Chloralictus*) *megastictus* Cockerell, new species

Female (type). Length about 6 mm., anterior wing 4; head and thorax rather dark green, with long outstanding entirely white pubescence; head broad, with projecting clypeus; antennæ black, mandibles dark red at extreme apex; apex of clypeus thickened, black; supraclypeal area large, brassy; mesothorax dullish, finely punctured, the median groove strong; scutellum shining on disc; area of metathorax broadly truncate behind, with thickened margin, the surface dull, the sculpture not distinctly seen under a lens; metathorax dark bluish; tegulæ large, black, very strongly punctured, rounded behind; wings clear hyaline, not reddish, the stigma and nervures very pale; legs black with abundant white hair, the hind basitarsi with a red apical brush; hind spur with four spines, the first two very long; abdomen shining black, the first tergite a little greenish; basal corners of second tergite, and the following ones entirely covered with white tomentum, which under the microscope has the appearance of small scales, though there are also long hairs; the fourth tergite is distinctly green under the hair.

Male. Similar, with the same large, black, punctured tegulæ; no light markings in region of mouth; clypeus with two shining elevations; face covered with white hair; flagellum long, pale red beneath; mesothorax highly polished on disc; scutellum with a median sulcus; plicæ at sides of area of metathorax very distinct; no light color on legs; abdomen shining black, the first three tergites with basal corners covered with pale hair, the others hairy all over, some of the hairs long, the others short and plumose.

San Miguel Island, end of July (Cockerell). The female at flowers of *Malacothrix implicata*, at Cuyler's Cove. This is superficially similar to *H. grinnelli*, and I had confused the two until I observed the tegulæ. Being a comparatively large species with punctured tegulæ it suggests *H. nymphaearum* Robertson, but that is considerably larger, with the area of metathorax very coarsely sculptured; in the male the scutellum is strongly bigibbous, and the face more narrowed below.

Halictus (*Chloralictus*) *perichlarus* Cockerell, new species

Female (type). Length about or nearly 7 mm., anterior wing 5; olive green, including the shining abdomen, the upper part of clypeus and the supraclypeal area cupreous, margin of clypeus broadly black; pubescence long and outstanding, entirely white; antennæ and mandibles black, the latter very faintly reddish at tip; head broad, cheeks ordinary; mesothorax strongly punctured, dullish, shining on posterior disc; scutellum shining, well punctured, with no median sulcus; area of metathorax coarsely plicate, with a thick shining rim; tegulæ very dark brown or black, without distinct punctures; wings grayish hyaline, a little yellowish at base, stigma and nervures pale; legs black with white hair; hind spur with four stout spines; abdomen shining olive green, the hind margins of the tergites reddish; the abdomen has long hair at sides, and tomentum at lateral bases of second and third tergites (under the microscope this appears as minute, scale-like hairs) and the apical tergites have in addition much long hair. One specimen, which I at first thought might be distinct, has the last three tergites closely hairy all over, while the second tergite has the basal corners very broadly hairy.

Male. Smaller and slender, with parallel-sided abdomen; no light marks in region of mouth or on legs; flagellum long, dusky red beneath; mesothorax shining; abdomen with little pale hair.

San Miguel Island, end of July, eleven females and one male (Cockerell). The male was at *Eschscholtzia*, near the ranch house, July 31; three females were taken at the same time on these flowers, but all the rest were at flowers of *Mesembryanthemum crystallinum*. The following key separates it from several which are more or less related:

- | | |
|---|---------------------------|
| 1. Females | 2 |
| ... Males | 5 |
| 2. Mesothorax strongly shining; abdomen dark green, the margins of tergites dark brown..... | 3 |
| ... Mesothorax dull or dullish..... | 4 |
| 3. Larger and more robust; clypeus and supraclypeal area shining green; area of metathorax dull, with fine parallel plicæ | <i>disparilis</i> Cresson |
| ... Smaller; clypeus hardly at all green; area of metathorax shining, basally plicate..... | <i>cattellae</i> Ellis |
| 4. Head oblong; mesothorax entirely dull; tegulæ pale or red | <i>pilosus</i> Smith |
| ... Head broad; mesothorax shining on disc; tegulæ dark | <i>perichlarus</i> Ckll |
| 5. Abdomen obscurely greenish; mesothorax highly polished; tarsi clear red..... | <i>disparilis</i> Cresson |
| ... Abdomen strongly green..... | 6 |

6. Head very broad; tegulæ and tarsi dark.....*perichlarus* C&K
 ... Head suboval, tegulæ pale; tarsi pale reddish.....*pilasus* Smith

The female may also be compared with *H. diversopunctatus* Ellis, which is a rather large species, with extremely hairy thorax, yellowish wings, plicæ of area of metathorax very strong, abdomen green.

Halictus (Chloralictus) punctiferellus Cockerell, new species

Female. A small species similar to *H. tegularis* Robertson and *H. tegulariformis* Crawford, with strongly punctured tegulæ and pectinate hind spur. In the Sandhouse table it runs straight to *H. tegulariformis*, except that the tegulæ are rounded posteriorly, but this character seems rather elusive depending on the angle of vision. Comparing Crawford's description of *H. tegulariformis*, it agrees in having the parapsidal grooves not apparent, and the punctures along the median groove of mesothorax not finer than the rest; but on comparing a specimen of *H. tegularis* received from Robertson, these characters do not seem very distinctive. The first tergite is very distinctly transversely lineolate, which it is not in *H. tegulariformis*, as described by Crawford. *H. tegulariformis* was described from Nevada, but according to specimens before me, it ranges from Colorado and New Mexico to Baja California. On comparing a New Mexico one with one from Baja California, the former has the area of metathorax tessellate, with few strongly divergent plicæ, while the latter has many irregular but more or less parallel plicæ¹. I strongly suspect that the species, as we have understood it, is composite. It seems, however, to be distinctly different from the Illinois *H. tegularis*.

Length about 4.6 mm., anterior wing nearly 4; head and thorax dark blue-green; pubescence rather dull white; mandibles and antennæ black, the flagellum very faintly brownish beneath; clypeus and supraclypeal area shining, clypeus rather golden-green above, a little coppery in middle, black apically; supraclypeal area colored like the shining band along orbits, the front being otherwise dull; mesothorax anteriorly with the median groove very deep, and the region on each side of it shining, though well punctured; posteriorly the mesothorax is dull; scutellum with a median depression, on each side of which is a sparsely punctured shining area; area of metathorax rather large, dull dark blue, seeming without plicæ, but the microscope shows very delicate well separated irregular radiating plicæ; tegulæ black; wings clear with very pale stigma and nervures, the stigma with no dark margin (the character of the stigma shows that this cannot be the female

¹Michener (1937) has separated a species of this group from Albuquerque, New Mexico, as *H. albuquerquensis* n. sp.

of *H. gaudialis* Sandhouse); legs black with white hair, a copper-red brush at end of hind basitarsi; abdomen rather broad, highly polished, black with the hind margins of the tergites brown or pallid; first two tergites with pale hair at basal corners, the others hairy but not densely so.

California: San Miguel Island, end of July (Cockerell).

Halictus (Chloralictus) pilosicaudus Cockerell, new species

Female. Length about 5 mm.; wings short, the anterior wings about 3 mm.; head and thorax olive green, the metathorax darker and bluer; but not strongly contrasting; pubescence dull white, covering the last three tergites with dense tomentum; head broad-oval; clypeus short, its lower part black, its upper part and the surpraclypeal area copper red, the supraclypeal area very brightly colored with almost a rose tint; middle of mandibles broadly red; flagellum short, dull red beneath; mesothorax dullish, the microscope showing very dense, uniform, strong punctures, often running in rows; scutellum shining anteriorly; area of metathorax large, triangular, with dense vermiform plicæ (the intervals shining) on somewhat more than basal half, the apical part very minutely rugose; posterior truncation small, shining; tegulæ pale, not punctured; wings clear, faintly yellowish, the stigma and nervures very pale, the stigma with no dark margin; legs black, with reddish tarsi, the basitarsi distinctly red; hind spur with three stout teeth; abdomen black, with a faint greenish or brassy lustre, in one specimen with a purple band across first tergite; margins of tergites pallid, more or less reddish; first two tergites showing the shining surface, though the basal corners are hairy, the others densely covered with hair.

California: San Miguel Island, end of July (Cockerell). It visits *Malacothrix implicata*. Nearest, apparently to *H. brunneiventris* Crawford, differing by the dense pilosity of apical half of abdomen, and the sculpture of metathorax. In the Sandhouse table it goes to *H. nevadensis*, which (paratype compared) is a very different species, with a round head. In my table it falls near *H. sparsus* Robertson, which is really quite different.

Halictus (Chloralictus) cabrilli Cockerell, new species

Male. Length about 4.7 mm., anterior wing about 4.2; rather slender, with large broad head, approximately circular, seen from in front; head and thorax bluish green, the mesothorax highly polished, with very distinct but well separated punctures; metathorax bluer, the basal area dark blue; mandibles and region of mouth all black; flagellum long, pale red beneath; legs black, the

hind tarsi red at extreme tip; abdomen shining black, with sparse outstanding hair, conspicuous at sides; pubescence dull white, long on head and thorax; tegulæ very dark brown, without distinct punctures; wings clear hyaline; nervures and stigma very pale, but stigma with a dusky margin. Orbits converging below; clypeus shining; sides of face with much white hair; scutellum highly polished on disc, appearing rather yellowish green, strongly contrasting with the dull dark blue base of metathorax; area of metathorax short, densely rugosoplicate, the intervals shining as seen under microscope; mesopleura and sides of metathorax densely punctured; margins of third and following tergites somewhat brownish; suture between first and second tergites impressed.

California: San Miguel Island, end of July, four (Cockerell). It visits flowers of *Malacothrix implicata*. It is named after the famous explorer, who died on San Miguel. In the Sandhouse table it could be sought for near *H. lactineus* Sandhouse, from which it is easily known by the dark legs, or *H. disparilis* Cresson, which is entirely different. There is some resemblance to *H. foveolatus* Robertson, from Illinois, and among the west coast species *H. daggetti* Cockerell is rather near, but is larger, with bluish head and thorax and milky wings. *H. gaudialis* Sandhouse, from La Jolla, has strongly punctured tegulæ.

Halictus miguelensis Cockerell, new species

Male. Length about 9 mm., anterior wing 7; rather slender, black with apical band on clypeus (with a small median extension above), labrum, spots on knees, and basitarsi, all very light yellow; pubescence white; mandibles black, red at tip; antennæ entirely black; flagellum very long, reaching base of abdomen; clypeus projecting; orbits strongly converging below; front and upper part of face with much white hair; a shining line along inner orbits to the top; mesothorax and scutellum shining, with numerous fine punctures; in lateral view, the sides of mesothorax appear dull, contrasting with the highly polished sides of scutellum; area of metathorax large, dull, densely covered with parallel plicæ, the microscope shows a complex system of rugæ, forming a sort of network, and also shows that the large postscutellum is coarsely sculptured; tubercles black; tegulæ not punctured, shining brown, with a light yellow spot in front; wings perfectly clear, not yellowish, iridescent, the large stigma clear rufous, the nervures light brown; outer nervures paler but hardly weaker; front tibiæ with a narrow pale stripe its whole length posteriorly, and anteriorly pale reddish; middle and hind tibiæ with a pale yellow mark at base, and a little reddish at apex; basitarsi very pale yellow, the following joints pale reddish, except the last, which is dark; abdo-

men highly polished, thinly hairy, margins of tergites inconspicuously pallid; second to fourth tergites with conspicuous light hair at sides of base, the microscope shows that this hair is strongly plumose.

California: San Miguel Island, July 30 (Cockerell). Related to *H. nigricalis* Vachal, but more robust, with more shining disc of mesothorax, and entirely black antennæ. On account of the clear, quite colorless wings, it cannot be associated with *H. pacificus* Cockerell or *H. truncatus* Robertson. It is not *H. cooleyi* Crawford (which I took in Santa Barbara) which has much yellow on the mandibles. *H. arctous* Vachal has a yellow spot on tubercles; *H. kincaidii* Cockerell has the clypeus all black; *H. pullilabris* Vachal has the labrum black.

The holotypes of the new species will be placed in the collection of the California Academy of Sciences at San Francisco.

THE EFFECT OF STYLOPIZATION ON ANDRENA PORTERAE COCKERELL

(Hymenoptera)

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Few andrenid bees are more strongly sexually dimorphic than *Andrena porterae* Cockerell. The sexes are so unlike that they were originally described as distinct species^{1,2} and remained unassociated until field observations suggested their identity. In addition to differences in general form and structure of mandibles, antennæ, legs, and abdomen, the females have the integument and pubescence entirely black. The male (first described as *Andrena leptanthi* Vier. and Ckll.) is brown, with the clypeus bright yellow, the pubescence pale brownish. Whatever doubt may have remained with regard to the identity of the sexes of *porterae* may now be dispelled by the capture of a styloped female exhibiting a partial reversal of secondary sexual characters. In color, structure of posterior pair of legs, and proportions of the antennal segments the example is more or less

¹ Cockerell, T. D. A., 1900, Ann. Mag. Nat. Hist. (7) 5:401, ♀

² Viereck and Cockerell, 1904, Ann. Mag. Nat. Hist. (7) 14:27, ♂